in Queensland (and the rest of the Australian continent) ; spines powerful, closely set, and entirely hiding the hairs ; 2nd claw on hind foot very long.

Hab. Common in all localities visited in Arnhem Land, inhabiting hilly and mountainous country. Not seen at Roebuck Bay (N.W. Australia).

The *Echidna* is highly valued for food by the natives, and, according to Dr. Dahl, its flavour is excellent.

Native names: Melk, Guarang.

3. On a Collection of Earthworms from South Africa, belonging to the Genus *Acanthodrilus*. By Frank E. Beddard, M.A., F.R.S., &c.

I have to thank Mr. W. L. Sclater, F.Z.S., Director of the South African Museum, for kindly forwarding to me a well-preserved series of Earthworms and also a few aquatic species, collected in the neighbourhood of Cape Town by Mr. Purcell of the South African Museum, and forming part of the collection of that Museum. The worms were without exception in an excellent state of preservation for microscopical work, having been prepared with chromic acid or corrosive sublimate, followed by alcohol. Extremely few specimens of Oligochæta have been hitherto collected in the Cape Colony. I am only acquainted with *Acanthodrilus capensis*, *Perichæta capensis*, and *Microchæta* from the near neighbourhood of Cape Town. The new species of earthworms of which specimens are contained in the collection forwarded to me by Mr. Sclater all belong to *Acanthodrilus* (*sensu stricto*). This fact is of considerable interest. Tropical Africa has numerous representatives of the family Acanthodrilidæ; but they are all members of the well-marked genus *Benhamia*. Up till the present time the sole instance of a true *Acanthodrilus* from that continent is the species described by myself some years ago as *Acanthodrilus capensis*. I shall, however, comment more fully upon this new fact in the distribution of the genus after describing the new species.

The table on p. 337 will serve to discriminate the species described in the present paper.

The main points of difference are indicated in the table. All the species, however, agree in certain particulars. In all of them the clitellum is of somewhat limited extent—limited, that is to say, as compared with some other species of the genus. The utmost extent of that region is from segment xiii. to segment xvi. In only one species, *A. africanus*, is the clitellum less than this, and in no species is it larger. In all these species the setæ have an unusual, but not unknown arrangement. The ventral setæ are comparatively strictly paired ; they are at any rate closer together than are the lateral setæ ; and in nearly all the species there is a closer approximation of the ventral setæ in a few segments on

	Prostomium.	Papillæ.	Spermathecæ.	Gizzard.	Length in mm.	Sperm-duct funnels.
Ac. arenarius ...	Inc.[1]	+	2 diverticula.	Large.	65	X., XI.
Ac. arundinis ...	,,	+	,,	Feeble.		X., XI.
Ac. sclateri.....	,,	0	,,	,,	45	X.
Ac. purcelli	Compl.[1]	+	1 diverticulum.	Large.	170	X.
Ac. excavatus ...	Inc.	0	,,	Feeble.	48	X.
Ac. falcatus	,,	+	2 or 3 diverticula.	,,	70	X., XI.
Ac. africanus.....	Compl.	0	1 diverticulum.	Large.	49	X.
Ac. photodilus ...	,,	0	,,	,,	81	X..
Ac. lucifuga	,,	+	,,	,,	70	X.

either side of the male pores on segment xviii. The two spermiducal pores of each side of the body are connected by a groove which is a common feature of this genus. In the middle of the groove on the xviiith segment lie the sperm-duct pores. On the inside of this invariably are the two setæ (both present) of the ventral pore. All the species have penial setæ.

As is the case with all members of the genus *Acanthodrilus*, there are two pairs of spermathecæ lying in segments viii., ix., which have at least one and sometimes more diverticula.

The first species I name :—

(1) **Acanthodrilus purcelli**, n. sp.

The collection contained ten specimens of this form, which were collected "under rotten logs in woods on the Newlands slope." Only one of these ten was sexually mature; this individual was the largest of the series. It is a long, rather slender worm of a dark coloration, showing also interference colours. It measured 170 mm. in length by 5 mm. in breadth. I counted 135 segments.

The *prostomium* is "complete," *i. e.* it is continued by grooves to the end of the first segment of the body.

The *clitellum* is saddle-shaped, not developed all round the body, but only dorsally and laterally; it occupies segments xiii.–xvi.

The *setæ* are in eight series; of these each two of the ventral couple are nearer to each other than are the two of the lateral couple.

[1] I apply the term "incomplete" to a *prostomium* which is not continued by furrows over the first segment, "complete" to one that is.

The *nephridiopores* are obvious and lie in front of seta 3.

The *spermathecal pores* are between segments vii./viii., viii./ix. They are in front of and a little to the outside of seta 2.

The *oviducal pores* are exactly in front of seta 1.

The *orifices* of the *spermiducal glands* correspond to the ventral couples of setæ; the two of each side are connected by a straightish groove which passes to the outside of the ventral couples of setæ, both of which are present upon segment xviii.

The worm has an unusual number of *genital papillæ*. In the sexually mature individual which I make the type, and from which the present description is taken, there are a pair of papillæ on each of segments x., xi., xii., xvi., xxi., xxii., xxiii., xxiv. These papillæ lie between and in front of the ventral couples of setæ; they are flattish circular in outline, and appear as if perforated by a pore in the middle. In a smallish specimen without the clitellum all the papillæ enumerated above were present with the addition of a pair upon the xiiith segment. In a larger worm, also without a clitellum, the same number were present with the exception of that upon segment xxiv. It is not usual for the papillæ to be so plain in immature examples of earthworms.

There is a large *gizzard* which I ascertained, by making a longitudinal section of the anterior end of another specimen of the species, to lie in segment vi. On dissection it appears to lie much further back owing to the backward slope of the intersegmental septa in this region of the body. The large intestine begins in segment xvi.

The *sperm-sacs* are racemose and lie in segments ix.–xi. The *sperm-duct funnels* are in segment x.

The two pairs of *spermathecæ* are not large, and lie as usual in viii. and ix.; the single diverticulum of each is in the segment in front of that which contains the pouch.

The *spermiducal glands* are short and stout.

Fig. 1.

Penial setæ of *Acanthodrilus purcelli*.

Penial setæ are present. I found in the individual selected for examination five of these setæ in a bundle. They are short and excessively spiny at the free extremity, as is shown in the accompanying drawing (fig. 1). When examined under a low power the end of the seta has the appearance of the "saw" of a Sawfish,

on account of the series of longish spines which occur along the two edges. A higher power reveals the fact that the spines are really arranged in complete rows which entirely surround the shaft of the seta for the distal half to one-third. The actual extremity is free of spines.

(2) **Acanthodrilus arundinis**, n. sp.

Of this species there were four examples in the collection, of which three were fully mature with a clitellum. They were collected "in and under loose clods of dead sedges on edge of water.

It is a slender and small species, measuring some 40 mm. in length. I counted 75 segments.

The *prostomium* is incomplete.

The *clitellum* completely encircles the body and embraces half of segment xiii. together with segments xiv., xv., xvi.

The *spermathecal pores* are conspicuous orifices lying on the boundary lines of segments vii./viii., viii./ix., on a line with the outer of the two ventral setæ.

The *spermiducal-gland pores* are highly conspicuous and lie in a position corresponding to the ventral couples of setæ. The two pores of each side of the body are connected by a groove which passes to the outside of the ventral couple of setæ of the xviiith segment.

On the last segment of the clitellum there was (at any rate in two of the sexual specimens—I did not examine the third before slicing it for microscopical purposes) a single median *genital papilla*.

The *setæ* are arranged in couples. The distances between the individual setæ vary somewhat in different regions of the body. Anteriorly the two setæ of each ventral couple are about half the distance from each other of that which divides the two lateral setæ. On the xvth and xvith segments the two ventral setæ approach each other, and on the xviiith they are very close together. After this they again diverge, and on the rest of the body the proportions between the intersetal spaces are much as in the anterior region of the body. The gradual approximation of the ventral setæ at the male pore is parallelled in that section of the genus *Microscolex* which Eisen proposed to call *Deltania*. On segments xvii. and xix. the ventral setæ are replaced by the modified penial setæ.

The *gizzard* is but slight; it lies in segment v. The circular muscles, which are ordinarily so strong in this organ, are in the gizzard of the present species not much thicker than the lining epithelium.

There appear to be no calciferous glands.

The *spermathecæ* are, as usual, two pairs; they are globular thin-walled pouches, each having two diverticula. The duct of the main pouch which leads to the exterior is very thick-walled and muscular, and into it open the diverticula. This duct was plugged with a mass of spermatozoa surrounded by a non-staining thick

chitinous-looking case, which I take to be a spermatophore. It is important to notice the apparent existence of spermatophores in this species, as they are structures which, apart from the Lumbricidæ, are not common among earthworms. The diverticula as usual contain masses of spermatozoa, there being none in the spermatheca itself. These are firmly attached to the glandular walls of the diverticula: these glandular walls are composed of a layer of granular, slightly staining cells, whose limits are not definable; the lumen which the cells leave is but narrow. I constantly found that of the two diverticula of each spermatheca, one lay in the segment containing the pouch, and the other in the segment in front.

The *sperm-sacs* are in segments ix.–xii. inclusive.

I did not observe the shape of the *penial setæ*, but ascertained their presence.

(3) **Acanthodrilus arenarius**, n. sp.

Of this species Mr. Purcell collected 23 specimens "in wet sand under stones on the edge of a small vley (lake), situated at the beginning of the sand-dunes due east from Wynberg station."

This is a small slender species rather over two inches in length, with a very prominent swollen clitellum. The measurement of an average individual was 65 mm.

The anterior end of the living worms is darkly pigmented.

The *prostomium* is incomplete.

The *setæ* are more closely paired ventrally than dorsally.

The *clitellum* occupies a portion of segment xiii. and all of segments xiv.–xvi. On the clitellum the *nephridiopores* are obvious, lying in front of seta 3.

This species has a number of *genital papillæ*; the numbers vary in different individuals. In the most fully developed there was a single median papilla upon segments viii.–x., xviii.–xxiii.; and in addition to these unpaired papillæ, paired papillæ upon each of segments xvii.–xix. On xviii. I found two pairs of these paired papillæ situated one in front of the other. These pairs were on a level with the generative orifices. The papillæ have a cup-like appearance. In sections, the epithelium of which they are composed is seen to be glandular like that of the clitellum but not so deep.

The *alimentary canal* has a fairly developed *gizzard*. The œsophagus alters its character in the xiiith segment, becoming rather wider and thinner-walled. In front the epithelial walls are folded, the only trace of calciferous glands which the worm possesses. The intestine begins in segment xv.

The *spermathecæ* are as usual in viii., ix. Each is a thin-walled oval pouch which communicates with the exterior by a much thicker-walled widish duct; into the latter open two sausage-shaped diverticula, one of which appears invariably to lie in front of the other in the segment, in fact in front of that which contains the pouch. The lumen of the diverticula is narrow, and attached to

the glandular cells is a regular fringe of spermatozoa. There are two pairs of sperm-duct funnels in segments x., xi.; corresponding to these are three pairs of sperm-sacs which lie in segments x., xi., xii. There is a single *penial seta* to each spermiducal gland; it is slightly notched at the extremity.

In the intestine of this worm I found numerous examples of an Infusorian belonging, or allied, to the genus *Opalina*, so frequent a parasite of the Oligochæta.

(4) **Acanthodrilus falcatus**, n. sp.

Of this new form Mr. Purcell collected no less than 56 examples from "Cape Flats; in wet sand on edge of a small vley between Retreat Station and Zeekoe Vley."

The species is not a large one; an individual which appeared to be quite typical measured 70 mm. by 3 mm. in breadth: it had rather more than 100 segments, but the mode of preparation (with corrosive sublimate) rendered the number of the segments a little difficult to ascertain with accuracy here and there. The posterior segments are noted to have been during life blackish.

The *prostomium* did not divide the first segment; it had rather the appearance of being simply a continuation of it, just indenting in a semicircle its front margin.

The ventral *setæ*, as in other species, are nearer to each other than the lateral; and the two setæ of the ventral rows converge slightly at the male pores.

The *clitellum* occupies segments xiii.–xvi.

Genital papillæ are present and vary somewhat in number in individuals. I found them to be present in not fully mature individuals as well as in those with a clitellum. On segments x., xi. were a single median papilla, or rather on the first of these two segments a closely approximated pair; on the xith segment the single papilla was seen on a closer examination to be composed of two fused papillæ. On xvi. and on xix. there was also a median papilla.

There is a slight *gizzard*; the intestine begins in segment xvi.

The *spermathecæ* show some variation. The oval pouch has at least two very white sausage-shaped diverticula which are of considerable length.

In the case of one spermatheca there was a third smaller diverticulum. In one worm each spermatheca had three diverticula, and in one spermatheca of this individual there were as many as four. The spermathecæ open on to the exterior in front of seta 2.

There are two pairs of *sperm-duct funnels* in x. and xi. The sperm-sacs are in segments ix.–xii.

The *spermiducal glands* are provided with *penial setæ*. The actual extremity of the seta is much hooked (whence the specific name of the worm) and is free from denticulations or ridges. Immediately in front of this the seta is much wider and is furnished for quite a short space with ridges, as in so many other species of *Acanthodrilus*.

(5) **Acanthodrilus excavatus**, n. sp.

This species comes from Knysna Forest, "in and under rotten wood, leaves, &c." It is a small slender species, measuring 48 mm. by 1·5 or 2 mm. I counted 90 segments in the individual selected for measurement. It is not unlike both *A. arundinis* and *A. sclateri* in general appearance, but may be distinguished at a glance from either of these by the deep excavation upon the segments which bear the three pairs of male pores; it is this peculiarity which suggested the specific name.

The *prostomium* is incomplete, and the other external characters are those of the majority of the Cape species. There are, however, so far as I could make out, no *genital papillæ*. The *male pores*, as already mentioned, lie in a deep excavation which is bridged over by ridges connecting the two spermiducal pores of each pair with each other.

I studied the anatomy of the worm by longitudinal sections.

The *clitellum* extends from segment xiii. to segment xvi.

The *gizzard* is slight, as in the two species with which I specially compare the present. There are no calciferous glands, and the intestine commences in segment xvii. Though there are no special calciferous glands, the œsophagus is moniliform in segments xii.–xiv., and its walls are there rather older and exceedingly vascular; in those segments too the supra-intestinal vessel was especially clear.

The *spermathecæ* have each a single long and sausage-shaped diverticulum.

The *sperm-sacs* are in segments ix.–xi., and, as appears to be always the case when the last pair of sperm-sacs are in the xith segment, there is but a single pair of testes and vas deferens funnels; these lie in segment x.

(6) **Acanthodrilus sclateri**, n. sp.

This is another small and slender species. The specimen selected for measurement was 45 mm. in length. There were no genital papillæ.

The *setæ* do not appear to converge at the male pores as in some other species of the genus described in the present communication.

The *prostomium* is incomplete; it is not always easy to be certain about the arrangement of the prostomium in these small *Acanthodrili*; so the remarks made here will apply to other small species, such as *A. arundinis* &c. The grooves which bound the prostomium where it impinges upon the first segment of the body cease abruptly and are not continued as far as the furrow which separates that segment from the second. In some specimens of this and the other small species it appeared to me that the two furrows by which the prostomium is continued over the first segment met a little way in front of the line dividing that segment from the one following.

The *clitellum* occupies segments xiii.–xvi.

The *gizzard*, as in the other small species, is very slight, and as in them is often hidden behind the mass of gland-cells which deck the pharynx.

There are no *calciferous glands*, and the large intestine begins in segment xvii.

There are but a single pair of *testes* and *vas deferens funnels*, which lie in segment x. As in worms with but one pair of testes, the *sperm-sacs* are limited to segments ix., x., xi.

The *spermathecæ* have two long tubular diverticula.

There are *penial setæ*.

(7) **Acanthodrilus photodilus**, n. sp.

Ten specimens of this species were collected in Knysna Forest, "in and under rotten wood, leaves, &c." It is a moderately large species, measuring 81 mm. by $3\frac{1}{2}$ in breadth. It is dark purple-coloured.

The *prostomium* is complete; the *setæ* are as in other Cape species.

There are no *genital papillæ* even in fully mature examples. The *nephridiopores* are in front of seta 3. There is a slight convergence of setæ at the male pore.

The *gizzard* is large. The intestine begins in xvi. Septa viii./xi. are thick.

The *spermathecæ* have a single lobate diverticulum.

The *sperm-sacs* are in segments ix.–xi. There is but a single pair of testes (?) and sperm-duct funnels in x.

The *spermiducal glands* are long and coiled; they occupy several segments. The *penial setæ* are long and not ornamented; the extremity is curved in a corkscrew fashion.

(8) **Acanthodrilus lucifuga**, n. sp.

In the same tube as that which contained the specimens already described as *A. photodilus* was a single worm which is obviously quite different.

Its dimensions are not widely different from those of *A. photodilus*, but it is a somewhat more slender worm.

The *clitellum* extends over segments xiii.–xvii. The other external characters are as in the last species saving for the presence of *genital papillæ*, which are totally wanting in *A. photodilus*. These papillæ are median and unpaired; they occur on each of segments xi., xii., xx., xxi.

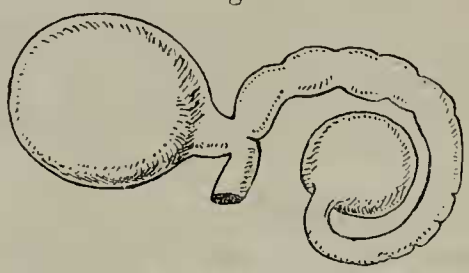
The *sperm-sacs* are in ix.–xi., and associated with this is the existence of only a single pair of sperm-duct funnels in x.

The *spermathecæ* have the remarkable form shown in the annexed drawing (fig. 2, p. 344). The pouch is roundish to oval, and communicates with the exterior by a short duct into which opens a long diverticulum which is curved round into a circle; at its extremity the diverticulum swells out into a globular chamber.

The *spermiducal glands* are, as is by no means usually the

case, quite straight, without a single bend or curve along their entire course; as I have but one specimen at my disposal, it is impossible to say whether this is a specific character or only

Fig. 2.



Spermathecæ of *Acanthodrilus lucifuga*.

individual. The *penial setæ* are smooth, without serrations; they are straight and not coiled at the end as in *A. photodilus*. In other respects this species comes into near relation with the last, having, as it has, a well-developed gizzard and no calciferous glands.

(9) **Acanthodrilus africanus**, n. sp.

From forest at George Town were collected 8 examples of a species which do not agree with any of those already described. It is a stoutish worm but short, measuring 49 mm. by 3 mm. in diameter. Such an individual possessed 94 segments.

The *prostomium* is complete. The *setæ* have the usual disposition characteristic of the Cape *Acanthodrili*. The *nephridiopores* open in front of seta 3. The ventral setæ converge at the male pore.

The *clitellum* occupies segments xiv.–xvi.

A well-developed *gizzard* is present.

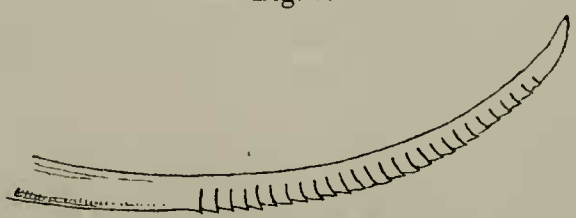
There are no *genital papillæ*.

The *spermathecæ*, as always, lie in segments viii., ix. Each has a lobate diverticulum.

The *sperm-sacs* are in segments ix.–xi.

The *spermiducal glands* are coiled, but not very long. Each

Fig. 3.



Penial setæ of *Acanthodrilus africanus*.

has appended a sac containing *penial setæ*. I counted four of these setæ in a single sac. They have the form which is illustrated in the accompanying sketch (fig. 3). The actual extremity of the

setæ is quite smooth; but a little way in front of this the shaft of the seta is encircled by a series of ridges which are perfectly smooth and not denticulate in any way; their direction is curved.

§ *General Remarks.*

This interesting collection of *Acanthodrilus* suggests several observations of a general character. In the first place, to meet with the genus so very prevalently in the Cape Colony is remarkable, though not perhaps altogether unexpected. That there are so many species (10) seems to negative any suggestion of accidental importation, as does their occurrence not only in the near neighbourhood of Cape Town, but at such distant places as the Knysna Forest. There is also the noteworthy fact that the *Acanthodrili* of South Africa belong to a distinct group of the genus, not unknown it is true elsewhere, as will be pointed out presently, but embracing all the species (with the possible exception of the originally described species *Acanthodrilus capensis*). This again is not suggestive of accidental importation. It may, I think, be fairly assumed that the species described in the present communication are truly indigenous. This being the case, we have a fauna of Earthworms in the temperate part of the African continent which is totally unlike that of tropical regions (characterized as it is by the Eudrilidæ and by the Acanthodrilid *Benhamia*, *not Acanthodrilus*) of that continent, and like that of South America and New Zealand. We have, in fact, in the three great land-masses which extend from the northern into the southern hemisphere—if we may allow a former connection between Australia and New Zealand—a sharp demarcation between the earthworm fauna of their southern and of their equatorial regions. In all of them *Acanthodrilus* is the prevalent genus of the Antarctic half. The bearing of this fact upon the theory of a former extension northward of the existing Antartic continent has been so often referred to by me, that I need do no more than allude to it. I may, however, remark that since I have written upon that matter Dr. Eisen has described two species of *Acanthodrilus* from California. But I am of opinion that this fact, like the spreading northward of *Microscolex*, is not fatal to my views.

To assume the converse, that this genus has started in the north and migrated southwards, is difficult[1] if we keep firmly hold of the fact that there is so little difference between the species of Patagonia and the Cape of Good Hope, not to mention New Zealand. The only alternative is to assume what is certainly becoming more and more fashionable as an assumption—a two-fold or three-fold origin of the worms which are here, and by all other writers, placed in one genus, *Acanthodrilus*. If, however, this view is to be entertained at all it cannot, in my opinion, be

[1] Since these words were written I have received from Dr. Michaelsen a paper ("Weiterer Beitrag zur Systematik der Regenwürmer," Verh. Hamburg, 1896) in which the tropical origin of *Acanthodrilus* is ably urged.

maintained so far as concerns the Patagonian and Cape species. I have pointed out in my Monograph of the Oligochæta the distinctness of the South American *Acanthodrili* from those of New Zealand. The latter all agree in having nephridia which alternate in position from segment to segment, the external orifices being now in front of the dorsal, now in front of the ventral setæ; besides this the nephridia show certain differences of structure according to their position. The only exception to this statement is found in the two closely allied species *A. annectens* and *A. paludosus*. These species, however, are different in other particulars from the typical *Acanthodrili* and should perhaps be placed in a genus apart. The Cape species, however, are so like those of South America, that I have more than once in preparing the foregoing descriptions doubted whether I had not before me identical forms from these widely distant localities. Though this is not, I believe, the case, there can be no doubt of their affinity.

APPENDIX.

On a new Genus of Earthworms belonging to the Family Eudrilidæ.

Among a number of Earthworms which I have recently received from Lagos, West Africa, through the kindness of the authorities at Kew, were two which appear to be representatives of a new genus.

This makes the seventh genus of Eudrilidæ known from the western side of the African continent, the other six being *Preussia* (Mich.), *Paradrilus* (Mich.), *Hyperiodrilus* (F. E. B.), *Heliodrilus* (F. E. B.), *Lybiodrilus* (F. E. B.), and *Alvania* (F. E. B.). It is interesting to note that the genus which I propose to describe in the present communication is nearly akin to several of these and shows no special points of affinity to any East African genus. The distinctness of the West African from the East African Eudrilidæ is the most salient fact in the distribution of this family within the continent. But although there are no genera known which range right across Africa, it is not possible to divide off the western from the eastern forms. The two subfamilies into which I have thought it admissible to divide the Eudrilidæ occur on both coasts. It is noteworthy, however, that, so far as is known, those genera like the present (*Hyperiodrilus*, *Heliodrilus*, *Alvania* and *Lybiodrilus*) which have several gizzards more posterior in situation than is usual are all of them inhabitants of West Africa. But this one character, though curious, can hardly be set against the three or four which I have used in the subdivision of the family.

This new species, for which I propose the name of Iridodrilus roseus, is a smallish worm of three inches in length. It has no pigment in the skin, or so little as not to interfere with the

coloration produced by the blood-vessels. The skin is thin and several of the organs show plainly through. As in nearly all Eudrilidæ, *dorsal pores* appear to be completely absent. The only exception seems to be the genera *Platydrilus* and *Eudriloides*. In no other family of terrestrial Oligochæta is there this nearly complete absence of structures so characteristic of earthworms. The absence of these pores may perhaps be related to the partially aquatic life of at any rate many members of the family; on the east coast of Africa the species of Eudrilidæ are largely met with in swamps, and we know that the purely aquatic genera of Oligochæta are without the dorsal pores for the most part. Exceptions to the statement occur among the aquatic members of the genus *Acanthodrilus*. But among the "Limicolæ" of Claparède there are no exceptions. Another feature in the organization of the Eudrilidæ which may possibly be correlated with the absence of dorsal pores, is the often exceedingly dark pigmentation of the chloragogen cells which cover the intestine, and the accumulations of secretory products within the peritoneal cells which cover the nephridia. If the dorsal pores have an excretory function, their absence would naturally lead to a greater accumulation of such waste substances as those referred to. That many of the Eudrilidæ have a great deal of pigment in the skin may be another fact to be noted in the same connection. But this pigmentation is not more excessive than in worms which possess dorsal pores.

The *setæ* have the arrangement that characterizes others of the West African genera that have been mentioned as nearest of kin. The ventral setæ are at some distance from each other, while the more dorsally placed pair are strictly paired. The distance which separates the two setæ of each ventral pair is five or six times as great as that which intervenes between the two setæ of the dorsal pair. The setæ themselves present nothing noteworthy in their form; they are rather small and not obvious until the skin is examined with the microscope.

The *nephridiopores* are very conspicuous orifices lying in line with the dorsal pair of setæ.

When a piece of the skin is examined after being well cleared with glycerine the *tegumentary sense-bodies*, which occur in many Eudrilids, are to be seen. These structures, which have so curious a resemblance to the Pacinian corpuscles of vertebrates, lie imbedded in the skin here and there apparently without regular arrangement. They are in the present worm of an elongated from and lie invariably with their long axis corresponding with the long axis of the worm's body.

The *clitellum*, as in many other species, is developed right round the body, having therefore the form to which it has been proposed to restrict the term cingulum. It occupies segments xiii.–xviii.

The *generative orifices* are exceedingly conspicuous. They are unpaired.

The *female orifice* is situated on the boundary line of segments

xii./xiii. It is rather less obvious than the *male pore*, which is between segments xvii. and xviii. The latter is more conspicuous on account of the fact that the actual pore lies upon the summit of an elevated tract of the skin. The position of the generative apertures and their general appearance presents the closest likeness to the West African *Lybiodrilus*, from which worm the elongated spermiducal glands appearing through the skin serve to differentiate the present species even before dissection.

The *alimentary canal* shows characters that are typically Eudrilid.

In each of segments x. and xi. is a single median *unpaired calciferous gland*, which is of a deep red colour and nearly globular in outline. In segment xiii. are the *paired calciferous glands*, which are white in colour and not large. Each is curved into rather more than a semicircle and the margin is indented. The *large intestine* begins in segment xiv. The *gizzards*, as in other allied forms, are some way down the intestine. There are three of them lying in segments xviii., xix., xx.; there is nothing peculiar about them except the position, which is not unusual among the Eudrilidæ, as already mentioned.

This earthworm has "*hearts*" in each of segments vii.–xi.

As in so many Eudrilids, the *funnels* of the *sperm-ducts*, of which there are two pairs in segments x. and xi., are followed by a dilated sac which in the present species is egg-shaped. The funnels themselves, which look backwards (so far as I could make out), appear to be plunged in the interior of the *sperm-sacs*, of which there are likewise two pairs; these latter organs depend from the anterior wall of segments xi. and xii. and are long and tongue-shaped, being flattened somewhat and wider towards the blind extremities. The testes I did not see.

The *spermiducal glands* are very conspicuous, and, as already mentioned, are visible through the translucent walls before the body is cut open. The two tubes have the nacreous appearance which is so usual with those glands in the present family; they are somewhat spirally twisted in their course, and therefore do not reach so far back in the body as would be the case did they lie straight. Each of the glands measures 22 mm. in length; the two unite just at their opening on to the exterior by a short terminal bursa. The *sperm-ducts* open into them some way before their termination. I could find no *penial setæ*.

The *female reproductive organs* conform generally to the plan characteristic of the family, and are to the full as complicated as in any other genus. The orifice already referred to leads into a sac which lies beneath the nerve-cord and extends back for a distance of 5·5 mm. It has a wide cavity, which in the specimen that I dissected appeared to be empty. Into this sac, which is the *spermathecal sac*, opens on either side a tube of some length which is disposed in a circle. This tube is at first wide and sacculated. After a course of about 10 mm. it suddenly narrows, and the lumen, at first wide in proportion to the thickness of the walls, becomes much constricted. This narrow tube then dilates to form what

Dr. Michaelsen[1] has termed the "*Eitrichterblase.*" Attached to this is the *egg-sac* or Receptaculum ovorum. The interior of this egg-sac is divided by trabeculæ into many compartments, in the interior of which are eggs in all stages of development surrounded by other germinal cells; the structure in fact is precisely like that which is now known to characterize so many, perhaps all the Eudrilidæ. I could not, however, detect a striated membrane surrounding the ripe ova such as that which I have described in *Hyperiodrilus*[2]. The "Eitrichterblase" communicates on the one hand with the short and muscular *oviduct* which opens on to the exterior in the fourteenth segment as usual, and on the other with a delicate tube which ends anteriorly in a swollen oval extremity. This latter sac lodges the *ovary*, which is thus, as in so many Eudrilids, in direct communication with the efferent apparatus.

It will be observed from the description of the egg-apparatus of the present earthworm, that though generally like that of the more highly developed Eudrilidæ, it differs in detail from that of any other genus. As it has been hitherto customary to mark the genera mainly by the differences in this structure, I feel justified in making a new genus for this species from Lagos.

4. On the Distribution of Marine Mammals. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received March 8, 1897.]

(Plate XXIV.)

Contents.

I. *Introductory Remarks.*

Most of the recent writers on Geographical Distribution have confined their attention to terrestrial mammals, or at any rate have but casually alluded to the marine groups of that Class. On the present occasion I wish to call your attention to some of the

[1] W. Michaelsen, "Oligochæten des naturhistorischen Museums in Hamburg," Jb. Hamb. Wiss. Anst. viii.

[2] F. E. Beddard, "On the Structure of two new Genera of Earthworms belonging to the Eudrilidæ and some Remarks on *Nemertodrilus*," Quart. Journ. Micr. Sci. xxxii. n. s.